Colloid Journal 2016 vol.78 N5, pages 712-716

Features of colloidal disperse structure formation in petroleum bitumen

Frolov I., Yusupova T., Ziganshin M., Okhotnikova E., Firsin A.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2016, Pleiades Publishing, Ltd.Temperature-modulated differential scanning calorimetry has been employed to analyze the structure-related thermal properties of petroleum bitumen. This method enables one to distinguish between “order–disorder” and glass transitions, thereby making it possible to monitor and identify structure-related phase transformations, the signals from which are invisible or overlapped in the thermograms of conventional differential scanning calorimetry. Bitumen has been shown to be a colloidal disperse system only under certain temperature–time conditions. Its dispersed phase may be represented by aggregates of two types with colloidal sizes. Saturated hydrocarbons form a solid crystalline phase in accordance with the regularities of first-order structural phase transitions and nucleation mechanism of phase separation. Asphaltenes and resins form a solid amorphous phase for a relatively long time as a result of a structural relaxation glass transition by the spinodal mechanism of phase separation.

http://dx.doi.org/10.1134/S1061933X16050069